



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/733,740	12/11/2003	Vinod Philip	2003P15291US	8395
7590 01/21/2005			EXAMINER	
Siemens Corporation Intellectual Property Department 170 Wood Avenue South Iselin, NJ 08830			BAREFORD, KATHERINE A	
			ART UNIT	PAPER NUMBER
			1762	
DATE MAILED: 01/21/2005				

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application N .

10/733,740

Applicant(s)

PHILIP ET AL.

Examiner

Katherine A. Bareford

Art Unit

1762

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 13-21 is/are allowed.
- 6) ☒ Claim(s) 1-4 and 6-12 is/are rejected.
- 7) ☒ Claim(s) 5 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>12/03</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Claims

1. The Examiner understands the term "low velocity oxygen fuel process" to mean a combustion powder thermal spray process or powder flame spray process, as described in the cited "Combustion Powder Thermal Spray Process (Flame Spray Process)" document.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).
4. Claims 1 and 6-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harrington et al (US 4645716).

Harrington teaches a method of applying a zirconia (zirconium oxide) based thermal barrier coating. Column 5, lines 35-50 and column 3, lines 20-45. The method includes selecting a composite powder comprising a first constituent comprising zirconia particles. Column 3, lines 30-65. The powder also has a second constituent comprising a second ceramic material, titanium oxide. Column 3, lines 30-65. The second ceramic material has a melting temperature sufficiently low so that the second constituent particles will at least partially melt when applied. Column 5, lines 55-65 and column 6, lines 50-55 (all of the particles melted for application). The particles can be applied by a combustion flame spray process (a low velocity oxygen fuel process/LVOF). Column 3, lines 20-30 (conventional flame spray processes can be used), and column 1, lines 20-35 (conventional flame spray guns can use combustion to produce the flame). The particles can also include yttria (yttrium oxide). Column 3, lines 30-45.

Claims 6-7: the titanium oxide can be 6-30 percent of the weight of the total powder materials. Column 3, lines 35-45.

Harrington teaches all the features of these claims except (1) that the LVOF process melts the titanium oxide particles and (2) that the second constituent can be from 20-40 volume percent of the composite powder (claims 6-7).

However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Harrington to fully melt the particles when spraying with combustion flame spraying as well as with plasma flame spraying in order to provide a desirably dense and bonded coating, because Harrington teaches that conventional flame spray processes, which includes combustion and plasma flame spraying, can be used and that it is desirable for the

coating to be fully melted on application. It would further have been obvious to perform routine experimentation to optimize the amounts of materials to be used so include titanium oxide in a volume amount that is between 20 and 40 volume percent, given that the titanium oxide can be 6-30 percent by weight, and one would select the best amount from the given range.

5. Claims 2-3 and 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harrington as applied to claims 1 and 6-7 above, and further in view of Japan 2002-275615 (hereinafter '615).

Harrington teaches all the features of these claims except (1) the calcium or strontium titanate (claims 2-3) and (2) the coefficient of thermal expansions (claims 8-10).

However, '615 teaches that a desirable material to be applied by thermal spraying to a substrate to form a thermal barrier coating is calcium titanate (CaTiO_3), which can be applied with yttria stabilized zirconia. See the abstract.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Harrington to use calcium titanate particles to replace the titanium oxide particles as suggested by '615, in order to provide a desirable barrier layer, because Harrington teaches to provide a thermal barrier layer using yttria, zirconia and titanium oxide particles, and '615 teaches the desirability of using yttria, zirconia and a form of titanium oxide, calcium titanate, to form thermal barrier coatings. It would further have been obvious to modify Harrington in view of '615 to use strontium titanate with an expectation of providing a desirable thermal barrier coating, because Harrington and '615 indicate the desirability of using yttria,

zirconia and titanium oxide materials when forming thermal barrier coatings, and it is the Examiner's position that strontium titanate is a well known titanium oxide material. As a result of using the yttria, zirconia and specific titanium oxide materials, the claimed ranges of the coefficients of thermal expansion would be inherently provided as in claims 8-10.

6. Claims 4 and 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harrington as applied to claims 1 and 6-7 above, and further in view of Spitsberg et al (US 2003/0027012).

Harrington teaches all the features of these claims except (1) the sodium-zirconium-phosphate-silicate (claim 4) and (2) the thermal conductivity (claims 11-12).

However, Spitsberg teaches that a desirable material to be applied by thermal spraying to a substrate to form a thermal barrier coating is zirconium phosphate materials (NZP-family materials), including sodium zirconate phosphate, which are applied with yttria stabilized zirconia (YSZ). Paragraphs [0022] and [0025].

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Harrington to use NZP material particles to replace the titanium oxide particles as suggested by Spitsberg, in order to provide a desirable barrier layer, because Harrington teaches to provide a thermal barrier layer using yttria, zirconia and titanium oxide particles, and '615 teaches the desirability of using yttria, zirconia and a form of NZP materials to form thermal barrier coatings. It would further have been obvious to modify Harrington in view of Spitsberg to use sodium-zirconium-phosphate-silicate with an expectation of providing a desirable thermal

Art Unit: 1762

barrier coating, because Harrington and Spitsberg indicate the desirability of using yttria, zirconia and NZP materials, including those with sodium zirconate phosphate when forming thermal barrier coatings, and it is the Examiner's position that sodium-zirconium-phosphate-silicatis a well known NZP material. As a result of using the yttria, zirconia and NZP materials, the claimed ranges of the coefficients of thermal conductivity would be inherently provided as in claims 11-12.

Allowable Subject Matter

7. Claim 5 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

8. Claims 13-21 are allowed over the prior art of record.

While it is suggested to apply zirconia/other ceramic thermal barrier materials by flame spraying as discussed above, and it is known to provide access to a damaged region of a zirconia based thermal barrier coating for repair, to clean the region, and apply a new thermal barrier coating (as discussed in Nagaraj et al, ^(US 5,723,078) column 4, lines 45-65 and column 6, lines 10-15), it is not taught or suggested by the prior art of record to apply a coating of the claimed materials to a component without removing the component from a machine of which it forms a part as is required by claim 5 and independent claim 13.


Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Katherine A. Bareford whose telephone number is (571) 272-1413. The examiner can normally be reached on M-F(6:30-4:00) with the First Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive P. Beck can be reached on (571) 272-1415. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9306 for regular communications and for After Final communications.

Other inquiries can be directed to the Tech Center 1700 telephone number at (571) 272-1700.

Furthermore, information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


KATHERINE BAREFORD
PRIMARY EXAMINER